NATIONAL MINING ASSOCIATION

A CRITICAL REVIEW MSHA'S PROPOSAL FOR CONTROL MEASURES TO BE EMPLOYED IN LOWERING MINERS' EXPOSURE TO RESPIRABLE COAL MINE DUST

Comments on Requirements for Designated Area Sampling and for Personal Sampling Devices to Remain with the Occupation or Designated Area being Sampled

Prepared by:

Robert E. Glenn, MPH

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INTRODUCTION

We have read the Mine Safety and Health Administration's (MSHA) proposed rule for "Lowering Miners' Exposure to Respirable Coal Mine Dust" (75 Federal Register 64412) with regard to sampling procedures to evaluate miners' exposure to respirable coal mine dust (CMD). We offer the following comments with regards to MSHA's requirements for designated area (DA) sampling, and the requirement for the personal sampling device to remain with the occupation or DA being sampled.

PERSONAL VERSUS AREA SAMPLING

In industrial hygiene practice there are generally two types of sampling methods used to measure exposures to workplace contaminants. The most important technique to determine a workers' exposure to a chemical is referred to as personal sampling. Personal samples are taken on or near the worker to determine exposure to the contaminant(s) present. These samples are taken with the sampling device or media attached to the worker's breathing zone and is worn continuously for all work and rest periods during the shift. The breathing zone is considered to be a 12-inch (30-centimeter) radius sphere of air space surrounding the miner's head. Air sampled from this region represents the air the miner is breathing while working. Breathing zone sampling can also be conducted by holding the sampling device in the breathing zone of the worker.

The second technique is to take an area sample. Area samples are placed in a fixed location in the workplace to determine the presence of potential contaminants in an area where workers work. During area sampling the worker may, or may not be, physically located in the area being sampled. Area sampling is most often used to locate potential contaminant generating sources and to evaluate engineering control measures.

NIOSH Recommendation on Personal Sampling

The National institute for Occupational Safety and Health (NIOSH) recommends that when the purpose of the environmental monitoring is to determine worker exposures, personal sampling or breathing zone sampling should be used (Leidel et al. 1979). Indeed, based on its review of the literature, NIOSH summarized the advantages of personal exposure monitoring to estimate exposures to coal mine dust to be (NIOSH, 1995):

- Personal samples correlate best with exposures judged by biological indicators.
- Personal samples represent variations in worker exposures better than fixed-point area samples.
- Personal samples estimate worker exposures better than area samples, which tend to underestimate worker exposures.
- Personal exposure estimates may be used to evaluate exposure-response and the effectiveness of exposure standards.

- Personal sampling must be used to accurately assess the effectiveness of dust avoidance technologies (e.g., those with remote control operations). Such technologies may be useful for improving worker safety and reducing workplace exposures.

NIOSH has conducted a comparison of personal and area sampling and concluded that personal sampling provides the best estimate of worker exposures and the temporal and spatial variability in those exposures (NIOSH 1995; Vincent 1994). In nearly all the studies where personal and area monitoring were compared with clinical measures of occupation-related adverse health effects, the personal exposure measurements provided the best correlations (Stopford et al. 1978; Linch et al. 1970; Linch and Pfaff 1971). Also, the personal exposures are frequently higher than the exposures measured by area monitoring (Niven et al. 1992; Cinkotai et al. 1984; Yoshida et al. 1980; Tomb and Ondrey 1976).

In a study of British longwall mines by the Institute of Occupational Medicine, Hadden et al. (1977) compared personal samplers with area samplers placed in the return airway. This sampling location presumably represents the maximum concentration of dust to which longwall miners are exposed. Nevertheless, the average dust concentration of the personal samples taken on a section was 10% higher than that in the area sample. The personal sampler data for the high-risk miners averaged 38% higher than the corresponding area samples. In

a companion study for continuous and conventional mining, Garland et al. (1979) concluded that fixed-point gravimetric samples were unreliable for estimating worker exposures over a work shift. The authors also found that the creation of localized dust clouds at the coal face contributes greatly to individual exposure patterns; thus, the use of fixed-point (e.g., area) monitors may underestimate worker exposures at the coal face.

Moreover, NIOSH interprets the Federal Mine Safety and Health Act of 1977 (the Act) with reference to "the average concentration of respirable dust in the mine atmosphere during each shift ***to which each miner*** in the active workings of such mine is exposed" [30 USC 842(b)] to provide for the control of each miner's personal exposure and that personal sampling is therefore preferable (emphasis added) (NIOSH 1995). NIOSH believes that area sampling should be substituted for personal sampling only where area sampling has been shown to measure an equivalent or higher concentration.

OSHA'S APPROACH TO PERSONAL SAMPLING

In the OSHA Technical Manual (OTM), the Agency provides careful guidance to compliance officers in conducting personal sampling for air contaminants (OSHA, 2011). Specifically, Chapter 1 of Section II of the OTM entitled "Personal Sampling for Air Contaminants" provides the following cautionary note to its compliance officers:

> This chapter provides basic information related to sampling air contaminants. These instructions are essential for acquiring

documented and valid exposure data that will be defensible in the event of contested citations.

Further on in the chapter the intent of personal sampling is specifically outlined under the discussion for a "Sampling Protocol":

The following guidance provides an overview of the sampling process:

1. Select the employees to be monitored and discuss the purpose of sampling. Inform the employees of ***when and where the sampling equipment will be removed***. Stress the importance of ***not removing or tampering with the sampling equipment***. Instruct the employees to notify their supervisor or the CSHO if the sampler requires temporary removal (emphasis added).

And, at subparagraph 2 the manual directs that the sampling device be placed on the person of the worker being sampled:

2. Place the calibrated ***sampling equipment on the employee*** so that it does not interfere with work performance or safety of the employee. Attach the collection device (filter cassette, charcoal tube, etc.) to the shirt collar or as ***close as practical to the nose and mouth of the employee's breathing zone*** (i.e., in a hemisphere forward of the shoulders within a radius of approximately nine inches).

In addition, OSHA's substance specific standards for air contaminants require that personal samples from the breathing zone be taken for compliance purposes. For example, the OSHA standard for asbestos at CFR 1910.1001(d)(1)(i) requires the following procedure for sampling for asbestos fibers;

> Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee.

Moreover, OSHA has maintained its adherence to personal sampling in letters of interpretation for crystalline silica and asbestos. In a letter regarding crystalline silica OSHA reiterated that for PELs in its air contaminants standard that "personal breathing zone" samples were to be used (OSHA, 1991)

> In determining compliance with OSHA's permissible exposure limits (PEL's), 29 CFR 1910.1000, OSHA industrial hygienists collect and analyze personal breathing zone samples taken during the course of an investigation to determine employee exposure to airborne levels of respirable silica.

Similarly, in an interpretation letter regarding air sampling measurements for asbestos, OSHA clarified that under the asbestos standard for general industry, construction or shipbuilding sampling requirements are the same (OSHA 2006).

> Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee.

MSHA Should Abandon Its Policy of Sampling Designated Areas

The NMA recommends that MSHA get rid of its inappropriate and outdated practice of attempting to determine personal exposures to a miner through DA sampling. Such a sampling strategy of placing a sampler in a stationary location where miners may, or may not, be working provides no useful information to personal exposures to CMD over the work shift to any miner in the DA. As determined by NIOSH, personal samples provide more accurate estimates of

personal exposures than area samples, which tend to underestimate worker exposures; better measure temporal variations in worker exposures over the work shift than fixed-point area samples; correlate best with exposures when related to disease endpoints; are better suited to accurately assess the effectiveness of dust avoidance technologies, such as remotely controlled mining machinery; and are better used to evaluate exposure-response and the effectiveness of exposure standards. For these reasons the NMA request that MSHA revise the language in the proposal to get rid of DA samples. Before promulgating a final rule that retains DA sampling, MSHA should seek the advice of NIOSH on this aspect of the proposed rule.

MSHA SHOULD ABANDON ITS POLICY OF THE CMD SAMPLER REMAIN WITH THE OCCUPATION OR AREA BEING SAMPLED

MSHA should abandon its illogical and unscientific scheme of requiring that the sampling device for measuring exposure to CMD remain with the occupation or DA being sampled during the entire shift to ensure that the respirable dust concentration levels are continuously being monitored. As discussed above regarding personal sampling, NIOSH interprets the Federal Mine Safety and Health Act of 1977 reference to "the average concentration of respirable dust in the mine atmosphere during each shift ***to which each miner*** in the active workings of such mine is exposed" to provide for the control of each miner's personal exposure and therefore the intent was that personal sampling is intended (emphasis added).

The proposed rule has the following example for two miners each operating a continuous miner for one-half of the shift:

> For example, if using a CPDM to sample a DO (continuous mining machine operator) on a continuous mining section and the duties of the machine operator are divided equally between Miner 1 and Miner 2, the dust sampler must be worn for half the shift by Miner 1 and the other half by Miner 2, while each is operating the continuous mining machine.

Such a strategy runs counter to conventional wisdom provided the purpose of sampling is to determine a miner's individual exposure during the shift for comparison to a regulatory exposure standard. The sampling in the example combines partial shift exposure for two miners but provides no information for assessing the average daily exposure for "each" of the two individual miners.

To our knowledge, no other regulatory agency has such a thoughtless approach in an attempt to assess personal exposure of an individual by combining exposures from two individuals. This strategy would suggest that the alcohol blood level of a bar patron spending four hours on a specific bar stool be transferred to and added to the blood alcohol level of the next person who happens to occupy that stool for purposes of determining if the second person is too inebriated to operate a motor vehicle. ***[Bruce, not sure you want to leave this in but it illustrates how idiotic the MSHA approach is.]***

The NMA recommends that MSHA get rid of its scientific indefensible strategy that the sampling device remains with the designated occupation,

designated work position or DA being sampled for the entire shift. MSHA should revise its requirements in the proposed rule to ensure that respirable CMD exposures for comparison to regulatory exposure limits be obtained for individual miners as specified in the Act. Before promulgating a final rule that retains provisions for sampling devices to remain with an occupation or DA, MSHA should seek the advice of NIOSH on this aspect of the proposed rule.

References

Cinkotai FF, Gibbs ACC, Sharpe TC [1984]. A comparison of exposure to airborne dust in cotton processing plants estimated from personal and workzone samples. Ann Occup Hyg 28(3):347-352.

Garland RP, Thorpe BL, Hadden GG [1979]. Investigations into dust surveillance and control in drivages, scourings and bord and pillar workings. Edinburgh, Scotland: Institute of Occupational Medicine, Report No. TM/79/17 (EUR. P51).

Hadden GG, Jones CO, Thorpe HL [1977]. A comparative assessment of dust surveillance procedures including the use of "personal" and "fixed position" sampling instruments. Edinburgh, Scotland: Institute of Occupational Medicine, Report No. TM/77/15 (EUR. P41).

Leidel NA, Busch KA, Lynch JR [1977]. Occupational exposure sampling strategy manual. Cincinnati, OH: U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, DHEW (NIOSH) Publication No. 77-173.

Linch AL, Wiest EG, Carter MD [1970]. Evaluation of tetraalkyl lead exposure by personnel monitor surveys. Am Ind Hyg Assoc J 31:170-179.

NIOSH, 1995, Criteria for a Recommended Standard – Occupational Exposure to Respirable Coal Mine Dust. DHHS (NIOSH) Publication No. 95-106

OSHA, 1991, Letter dated 02/11/1991, from Gerald Scannell, Assistant Secretary to Mr. Eric Lapp. Last accessed 05-06-2011: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=20191

OSHA, 1994, Letter dated 04/26/1994, from Ruth McCully, Director to Janet Fox. Last accessed 05-06-2011: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=21467

Niven RM, Fishwick D, Pickering CAC, Fletcher AM, Warburton CJ, Crank P [1992]. A study of the performance and comparability of the sampling response to cotton dust of work area and personal sampling techniques. Ann Occup Hyg 36(4):349-362.

Stopford W, Bundy SD, Goldwater LJ, Bittikofer JA [1978]. Microenvironmental exposure to mercury vapor. Am Ind Hyg Assoc J 39:378-384.

Tomb TF, Ondrey RS [1976]. Determining the feasibility of area sampling to enforce the respirable dust standard in underground coal mines. Pittsburgh, PA: Pittsburgh Technical Support Center, Mining Enforcement and Safety Administration, IR 1037.

Vincent JH [1994]. Measurement of coarse aerosols in workplaces: a review. Analyst 119:13-18.